

EXHIBIT A

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Predicting behavioral changes associated with age-related cognitive impairment in dogs.

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OBJECTIVE: To monitor the progression of age-related behavioral changes in dogs during a period of 6 to 18 months and to determine whether signs of dysfunction in any of 4 behavioral categories can be used to predict further impairment. **DESIGN:** Age-stratified cohort study. **ANIMALS:** 63 spayed female and 47 castrated male dogs 11 to 14 years of age. **PROCEDURE:** Data were collected from randomly selected dog owners who were interviewed by telephone twice at a 12- to 18-month interval; data were included if the dog had lived ≥ 6 months between interviews. The interview focused on signs of impairment in the following behavioral categories: orientation in the home and yard, social interactions with human family members, house training, and the sleep-wake cycle. Dogs were determined to have impairment in 0 behavioral categories (on the basis of ≤ 1 sign for each category), impairment in 1 category (≥ 2 signs of dysfunction in that category), or impairment in ≥ 2 categories. **RESULTS:** Between interviews, 22% (16/73) of dogs that did not have impairment in a category at the time of the first interview developed impairment in that category by the time of the second interview. Forty-eight percent (13/27) of dogs that had impairment in 1 category at the time of the first interview developed impairment in ≥ 2 categories by the time of the second interview and were significantly more likely to develop impairment in ≥ 2 categories, compared with dogs that initially had impairment in 0 categories. Dogs with 1 sign of dysfunction in orientation were significantly more likely to develop impairment in that category, compared with dogs that had 0 signs of dysfunction in orientation. **CONCLUSIONS AND CLINICAL RELEVANCE:** Age-related behavioral changes in dogs are progressive. Clinicians should consider trying to predict which dogs are most likely to become progressively impaired during the subsequent 6 to 18 months.

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Prevalence of behavioral changes associated with age-related cognitive impairment in dogs.

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OBJECTIVE: To determine the prevalence of age-related behavioral changes, namely impairment, in a randomly chosen population of dogs. **DESIGN:** Age-stratified cohort study. **ANIMALS:** 97 spayed female and 83 castrated male dogs that were 11 to 16 years old. **PROCEDURE:** Data on possible impairment in 4 behavioral categories (ie, orientation in the home and yard, social interaction, house training, and sleep-wake cycle) linked to cognitive dysfunction were obtained from dog owners, using a structured telephone interview. Hospital records of dogs had been screened to exclude dogs with dysfunction in organ systems that may cause behavioral changes. Dogs with behavioral impairment were those with ≥ 2 signs of dysfunction within a category. Dogs with impairment in 1 category were considered mildly impaired and those with impairment in ≥ 2 categories were considered severely impaired. **RESULTS:** Age by sex interactions for dogs with impairment in any category were not significant, and, therefore, data on castrated males and spayed females were pooled for analyses across ages. The prevalence of age-related progressive impairment was significant in all categories. The percentage of 11- to 12-year-old dogs with impairment in ≥ 1 category was 28% (22/80), of which 10% (8/80) had impairment in ≥ 2 behavioral categories. Of 15- to 16-year-old dogs, 68% (23/34) had impairment in ≥ 1 category, of which 35% (12/34) had impairments in ≥ 2 categories. There were no significant effects of body weight on the prevalence of signs of dysfunction in the behavioral categories. **CONCLUSIONS AND CLINICAL RELEVANCE:** Data collected provide estimates of the prevalence of various degrees of age-related behavioral changes associated with cognitive dysfunction in dogs. Age-related behavioral changes may be useful indicators for medical intervention for dogs with signs of cognitive impairment.